I Claim:

1. A crystalline filter, comprising:

a host crystal that is transparent within at least a desired spectral region; and

at least one dopant incorporated within the host crystal;

wherein the at least one dopant provides optical absorption bands such that the crystalline filter has a pass band within the desired spectral region.

2. The filter of Claim 1, wherein the desired spectral region is within the wavelength range of between about 200 nm and about 350 nm.

3. The filter of claim 1, wherein the transparent host material is chosen from the group consisting of MgF_2, CaF_2, SrF_2, BaF_2, ZnF_2, and CdF_2.

4. The filter of Claim 3, wherein the at least one dopant includes a fluoride compound dopant.

5. The filter of Claim 4, wherein the fluoride compound includes a lanthanide or actinide fluoride, wherein the lanthanide or actinide is chosen from the group of elements consisting of Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and U.

6. The filter of Claim 5, wherein the at least one dopant further includes second dopant compound of the lanthanide or actinide forming one of a nitride compound, an oxide compound, a boride compound, a carbide compound or a hydroxide compound.

7. The filter of Claim 1, wherein the host material is CaF_2 and the at least one dopant includes CeF_3 and CeN.

8. The filter of Claim 1, wherein the host material is CaF_2 and the at least one dopant includes CeF_3, CeN, EuF_3 and EuN.

9. The filter of Claim 1, wherein the host material is CaF_2 and the at least one dopant includes CeF_3 and CeC_2.

10. The filter of Claim 1, wherein the host material is CaF2 and the at least one dopant includes CeF_3 and $Ce(OH)_2$.

11. A UV detection system, comprising:

an optical system, the optical system capable of focusing incident radiation;

a UV crystal filter having a pass band in a desired spectral region, the UV crystal positioned to receive focused incident radiation from the optical system; and

a radiation detection system sensitive to radiation in at least the pass band of the UV crystal filter, the radiation detection system positioned to receive radiation transmitted through the UV crystal filter.

12. The system of Claim 11, wherein the desired spectral region includes radiation having a wavelength of between about 200 nm and about 350 nm.

13. The system of Claim 11, wherein the optical system includes filters that filter out radiation having wavelengths above those in the desired spectral region.

14. The system of Claim 13, wherein the UV crystal filter

a host crystal that is transparent within at least the desired spectral region; and

at least one dopant incorporated within the host crystal;

wherein the at least one dopant provides optical absorption bands such that the crystalline filter has the pass band within the desired spectral region.

15. The filter of claim 14, wherein the transparent host material is chosen from the group consisting of MgF_2, CaF_2, SrF_2, BaF_2, ZnF_2, and CdF_2.

16. The filter of Claim 15, wherein the at least one dopant includes a fluoride compound dopant.

17. The filter of Claim 16, wherein the fluoride compound includes a lanthanide or actinide fluoride, wherein the lanthanide or actinide is chosen from the group of elements consisting of Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and U.

18. The filter of Claim 16, wherein the at least one dopant further includes second dopant compound of the lanthanide or actinide forming one of a nitride compound, an oxide compound, a boride compound, a carbide compound or a hydroxide compound.

19. The filter of Claim 14, wherein the host material is CaF_2 and the at least one dopant includes CeF_3 and CeN.

20. The filter of Claim 14, wherein the host material is CaF_2 and the at least one dopant includes CeF_3, CeN, EuF_3 and EuN.

21 The filter of Claim 14, wherein the host material is CaF_2 and the at least one dopant includes CeF_3 and CeC_2.

22. A method of forming a crystal filter, comprising:

forming a mixture having a host material and at least one dopant;

growing a crystal from the mixture; and

fabricating the crystal into the crystal filter,

wherein the crystal filter has a specified pass band.

23. The method of claim 22, wherein the host material is chosen from the group consisting of MgF_2, CaF_2, SrF_2, BaF_2, ZnF, and CdF_2.

24. The method of claim 22, wherein the at least one dopant includes a lanthanide or actinide fluoride, the actinide or lanthanide being chosen from the group of elements consisting of Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu and U.

25. The method of claim 24, wherein the at least one dopant further includes a compound of the lanthanide or actinide and one of a group consisting of nitrogen, oxygen, boron, carbon, or hydroxide.

26. The method of claim 22, wherein the host material of the mixture is CaF_2.

27. The method of claim 26, wherein the at least one dopant of the mixture includes:

about 0.01 to about 5.0 mole percent of CeF_3; and

about .001 to about 1.0 mole percent of CeN.

28. The method of claim 27, wherein the mixture further includes

between about 0.01 to about 5 mole percent of one or more compounds chosen from a group consisting of MnF_2, CoF_2, and PbF_2.

29. The method of claim 27, wherein the mixture further includes adding up to about 20.0 mole percent of NaF.

30. The method of Claim 27, wherein the at least one dopant of the mixture further includes up to about 5.0 mole percent of EuF_3 and up to about 1.0 mole percent of EuN to the mixture.

31. The method of Claim 29, wherein the mixture includes about 0.3 mole percent of CeF_3, about 0.05 mole percent of CeN, about 0.3 mole percent of MnF_2 and about 2.0 mole percent of NaF.

32. The method of Claim 30, wherein the mixture includes about 0.2 mole percent of CeF_3, about 0.05 mole percent of CeN, about 0.1 mole percent of EuF_3, about 0.05 mole percent of EuN, about 0.3 mole percent of PbF_2 and about 2.0 mole percent of NaF.

33. The method of Claim 26, wherein the at least one dopant of the mixture includes about 0.25 mole percent of CeF_3 and about 0.01 mole percent of CeC_2.

34. The method of Claim 33, wherein the mixture further includes between about 0.01 to about 5.0 mole percent MnF_2.

35. The method of Claim 33, wherein the mixture further includes between about 0.01 to 5.0 mole percent of CoF_2.

36 The method of Claim 33, wherein the mixture further includes between about 0.01 to about 5.0 mole percent of PbF_2.

37 The method of Claim 33, wherein the mixture further includes about 1.6 mole percent of NaF.

38 The method of Claim 26, wherein the at least one dopant of the mixture includes about 0.30 mole percent of CeF_3 and about 0.6 mole percent of NaOH.

39 The method of Claim 38, wherein the mixture further includes 0.2 mole percent of PbF_2 and about 1.6 mole percent of NaF.

40. The method of claim 22, wherein growing a crystal from the melt comprises:

placing the mixture into a crucible;

placing the crucible within a vacuum furnace;

backflushing the vacuum furnace;

raising the temperature of the vacuum furnace to above the melting temperature of the crystal to form a melt;

lowering the crucible out of the high temperature region until the crucible is accomplished;

cooling the crucible to room temperature; and

removing the crystal from the crucible.

41. The method of claim 40, wherein backflushing the vacuum over comprises, at least once, evacuating the vacuum furnace; and filling the vacuum furnace with an inert gas.

42. The method as in claim 41 wherein the inert gas is Argon.

43. The method of claim 40, wherein raising the temperature of the vacuum furnace includes:

increasing the temperature of the furnace, within the time of about 0.5 hours, to a temperature of about 400°C;

holding the temperature of the furnace at about 400°C for at least 0.5 hours;

raising the temperature of the furnace, in a time of at least about 0.5 hours, to a temperature of about 1450°C.

44. The method of Claim 40, wherein lowering the crucible out of the high temperature region until the crucible is accomplished includes lowering the crucible at a rate of about 0.5 to about 2.0 mm/hr.

45. The method of Claim 40, wherein cooling the crucible to room temperature includes cooling the furnace to room temperature in about 24 hours.

46. The method of Claim 40, further including flowing a gas into the vacuum furnace to a point above the surface of the melt wherein the gas interacts with the at least one dopant of the mixture in order to form at least one second dopant of the mixture.

47. The method of Claim 46, wherein the gas is from a group consisting of nitrogen, oxygen, or water vapor.

48. The method of Claim 46, wherein between 5 and 100 cc/min of gas and between 2 and 100 cc/min of hydrogen Is flowed through a tube in the vacuum furnace to the surface of the melt.

49. The method of claim 22, wherein growing a crystal from the melt comprises:

placing the mixture into a crucible;

placing the crucible within a two-zone vacuum furnace;

backflushing the two-zone vacuum furnace;

raising the temperature of the vacuum furnace to above the melting temperature of the crystal to form a melt;

creating a temperature gradient along a vertical axis of the crucible;

cooling the two-zone furnace to a temperature below which the crystal is formed;

lowering the temperature of the two-zone furnace to room temperature; and

removing the crystal from the crucible.

50. The method of Claim 49, wherein backflushing the vacuum over comprises, at least once, evacuating the vacuum furnace; and filling the vacuum furnace with an inert gas.

51. The method as in claim 50 wherein the inert gas is Argon.

52. The method of Claim 49, wherein raising the temperature of the vacuum furnace to above the melting temperature of the crystal includes raising the temperature to about 1450°C and holding the two-zone furnace at 1450°C for approximately two hours.

53. The method of Claim 49, wherein the temperature gradient is between about 1 to 20°C per centimeter.

54. The method of Claim 53, wherein cooling the two-zone furnace to a temperature below which the crystal is formed includes cooling the two-zone furnace at a rate of between 5 and 20 °C per hour.

55. The method of Claim 54, wherein the temperature below which the crystal is formed is about 1250°C.

56. The method of Claim 49 wherein lowering the temperature of the two-zone furnace to room temperature includes lower the temperature of the two-zone furnace at a rate of about 50°C per hour.

57. The method of Claim 49, further including flowing a gas into the vacuum furnace to a point above the surface of the melt wherein the gas interacts with the at least one dopant of the mixture in order to form at least one second dopant of the mixture.

58 The method of Claim 57, wherein the gas is from a group consisting of nitrogen, oxygen, or water vapor.

59 The method of Claim 57, wherein between 5 and 100 cc/min of gas and between 2 and 100 cc/min of hydrogen Is flowed through a tube in the vacuum furnace to the surface of the melt.

60. The method of claim 22, wherein growing a crystal from the melt comprises:

placing the mixture into a crucible;

placing the crucible within a vacuum furnace;

backflushing the vacuum furnace;

raising the temperature of the vacuum furnace to above the melting temperature of the crystal;

introducing a seed crystal to the melt;

rotating the seed crystal in the melt;

cooling the vacuum furnace to a temperature at which nucleation on the seed crystal occurs;

pulling the seed crystal from the melt;

lowering the temperature of the vacuum furnace to room temperature when a sufficient length of the crystal is formed; and

removing the crystal from the vacuum furnace.

61. The method of Claim 60, wherein backflushing the vacuum over comprises, at least once, evacuating the vacuum furnace; and filling the vacuum furnace with an inert gas.

62. The method as in claim 61 wherein the inert gas is Argon.

63. The method of Claim 60, wherein raising the temperature of the vacuum furnace to above the melting temperature of the crystal includes raising the temperature to about 1450°C and holding the two-zone furnace at 1450°C for approximately two hours.

64. The method of Claim 60, wherein the seed crystal is rotated at between about 2 and about 20 rpm.

65. The method of Claim 60, wherein the temperature at which nucleation on the seed crystal occurs is about 1415°C.

66. The method of Claim 60, wherein pulling the seed crystal from the melt includes pulling the seed crystal at a rate of between about 0.1 to about 5.0 mm per hour.

67. The method of Claim 60, further including adding a gas atmosphere into the vacuum furnace wherein the gas interacts with the at least one dopant of the mixture in order to form at least one second dopant of the mixture.

68. The method of Claim 67, wherein the gas atmosphere is from a group consisting of nitrogen, oxygen, or water vapor.

69. The method of Claim 22, wherein growing a crystal from the mixture comprises:

heating a substrate to a sufficiently high temperature;

depositing the mixture on the substrate.

70. The method of Claim 69, wherein heating the substrate includes heating a CaF_2 substrate to between about 400 and about 600°C.

71. The method of Claim 69, wherein depositing the mixture includes evaporating the mixture onto the substrate.

72. The method of Claim 69, wherein depositing the mixture includes sputtering the mixture onto the substrate.

73. The method of Claim 22, wherein fabricating the crystal into the crystal filter includes

diffusing a gas into the crystal so that the gas interacts with the at least one dopant to create at least one second dopant.

74. The method of Claim 73, wherein the gas is from a group consisting of nitrogen, oxygen, or water vapor.

75. The method of Claim 73, wherein diffusing the gas into the crystal includes

heating the crystal in a furnace to a temperature below melting and introducing the gas to the furnace.